LPGS CDR ADDENDA

(2 of 3)

Package Contents

ADDENDUM 2 - LPGS OPERATIONAL SCENARIOS

Introduction

Operational scenarios describe the allocation and flow of LPGS operations activities between the operations staff and subsystems. Although the majority of nominal LPGS functions—such as product ingest, formatting and distribution, radiometric and geometric correction, and initial quality assessments—are intended to be performed automatically, without operator intervention, operations staff have roles in both nominal and non-nominal activities. The scenarios are meant to provide the basis for dialogue between systems engineering, development, and operations representatives. Key operations activities have been categorized as nominal and non-nominal as indicated below.

Nominal Activities	Non-Nominal Activities
1. Start up LPGS 2. Shut down LPGS 3. Process L1 product (nominal end-to-end L1 processing flow) 4. Cancel L1 processing 5. Retrieval of characterization results by IAS	1. Analyze trouble ticket 2. Process L1 product (non-nominal) 3. Recover from LPGS failure

The flow of operations activities performed by operations staff and LPGS subsystems to accomplish key LPGS functions are detailed in the sections that follow.

Operations Staff

Operations staff are required to perform activities that the LPGS subsystems cannot perform automatically. Operations activities performed by the operations staff can be grouped into system operations, production control, QA, and AA categories. System operations, performed by the system operator (Sys Opr), include initiating system startup and shutdown, configuring system software and hardware, backing up system software in support of both nominal and contingency operations, and monitoring system status. Production control operations, performed by the production operator (Prod Opr), include monitoring the L1 processing activities, manually modifying LPGS work orders, initiating statistics generation, and canceling product generation requests. QA and AA activities are performed by the analyst. The analyst visually inspects images before distribution, analyzes and inspects processing quality information, and resolves processing anomalies found both before and after distribution of the L1 product. A single operations staff member can support multiple operations staff positions, and multiple staff members can support a single operations position as hardware architecture permits.

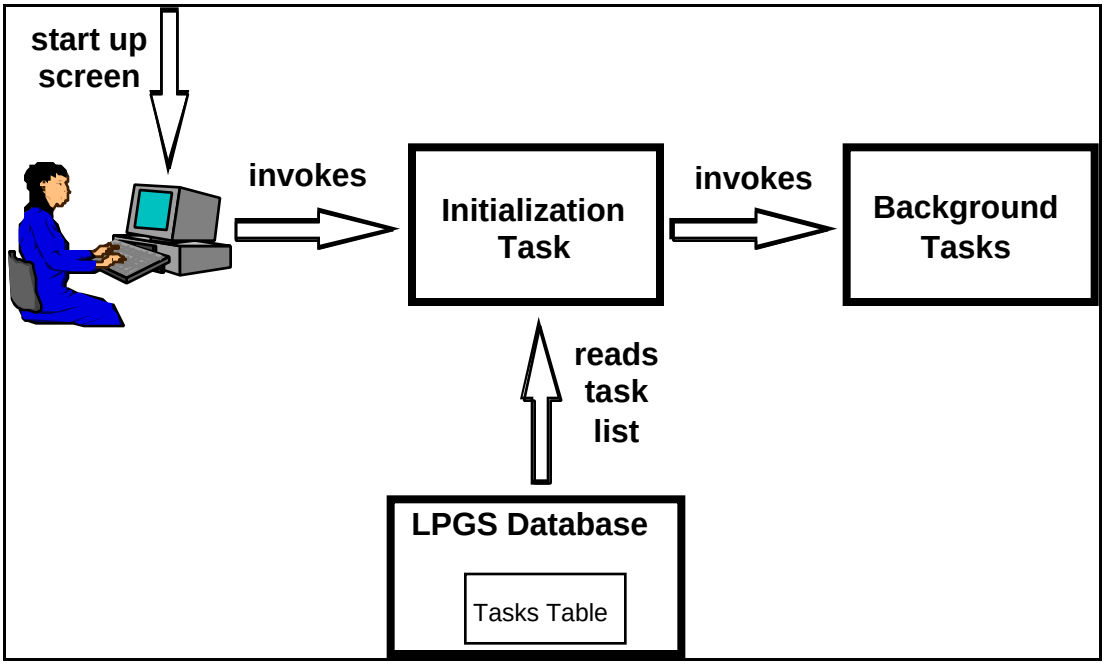
Nominal Operations

Nominal operations scenarios are presented in the sections below according to the sequentially numbered steps of the operations activities and the subsystems or operators by which they are performed. The scenarios are provided as examples of typical operations activities and are not intended to indicate the only sequence of activities that may occur during nominal activities.

Start Up LPGS

LPGS startup activities are performed to boot and power on LPGS hardware, initialize the LPGS UI, and initiate optional periodic monitoring activities.

Step	Subsystem/Operator	Action
1	Sys Opr	Power on/boot workstations and monitors, and log onto operations interface workstation
2	Sys Opr	Start Oracle DBMS
3	Sys Opr	Start up LPGS user interface
4	Sys Opr	Select option to start tasks
5	PCS	Start up LPGS background tasks
6	Prod Opr	Display LPGS event log
7	Analyst	Log onto QA/AA workstation
8	Analyst	Display anomaly main window
9	Analyst	Display anomaly status table

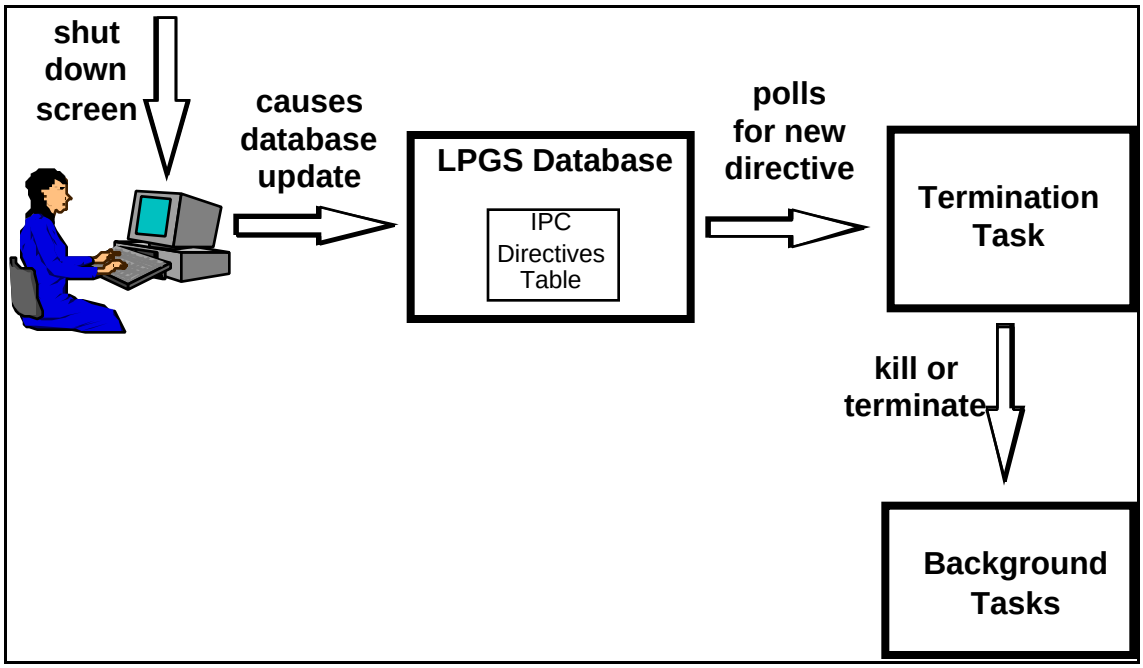


Start Up LPGS

Shut Down LPGS

LPGS shutdown activities are performed to take LPGS hardware off line and terminate all software processes. The LPGS startup scenario must be performed before the LPGS shutdown scenario.

Step	Subsystem/Operator	Action
1	Sys Opr	Display LPGS UI
2	Sys Opr	Display LPGS event log
3	Prod Opr	Select terminate tasks option from menu
4	PCS/DMS/QAS	Terminate current processing
5	Analyst	Exit anomaly windows and log off QA/AA workstation
6	Sys Opr	Exit LPGS UI
7	Sys Opr	Terminate Oracle DBMS
8	Sys Opr	Log off operator workstation
9	Sys Opr	Power off workstations and monitors



Shut Down LPGS

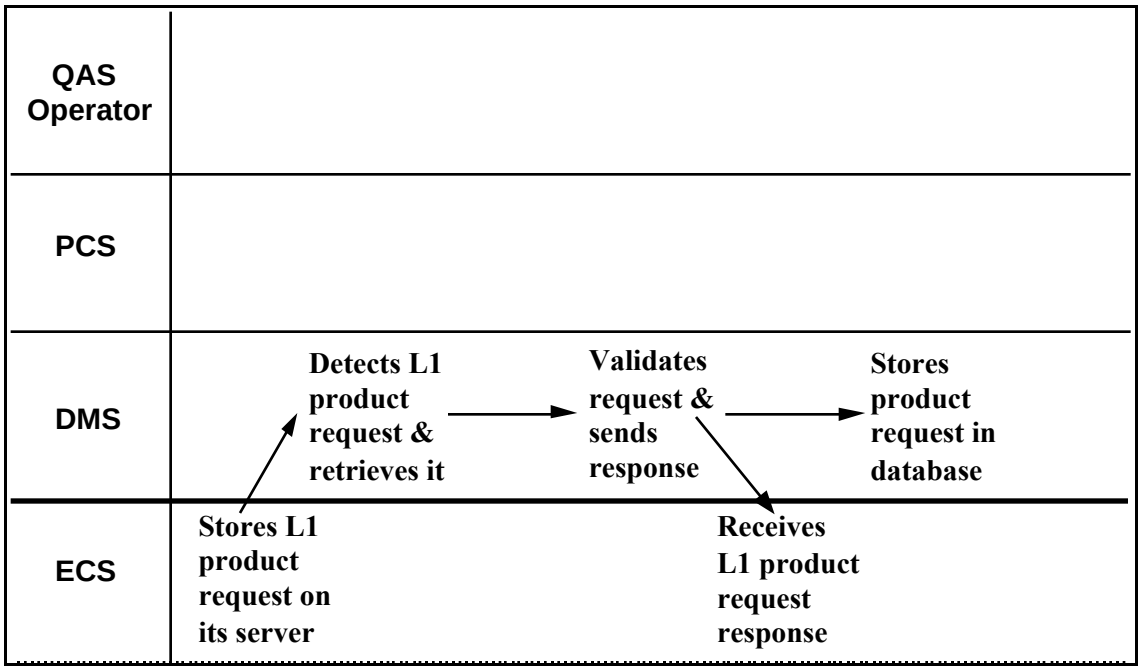
Process L1 Product (Nominal End-to-End Processing Flow)

The L1 product processing scenario provides an example of nominal processing of a single L1G product without errors. The system startup scenario must be performed before commencement of the process L1 product scenario. The following scenario assumes that the produced L1 image is of acceptable quality and that the work order has been set to indicate visual inspection.

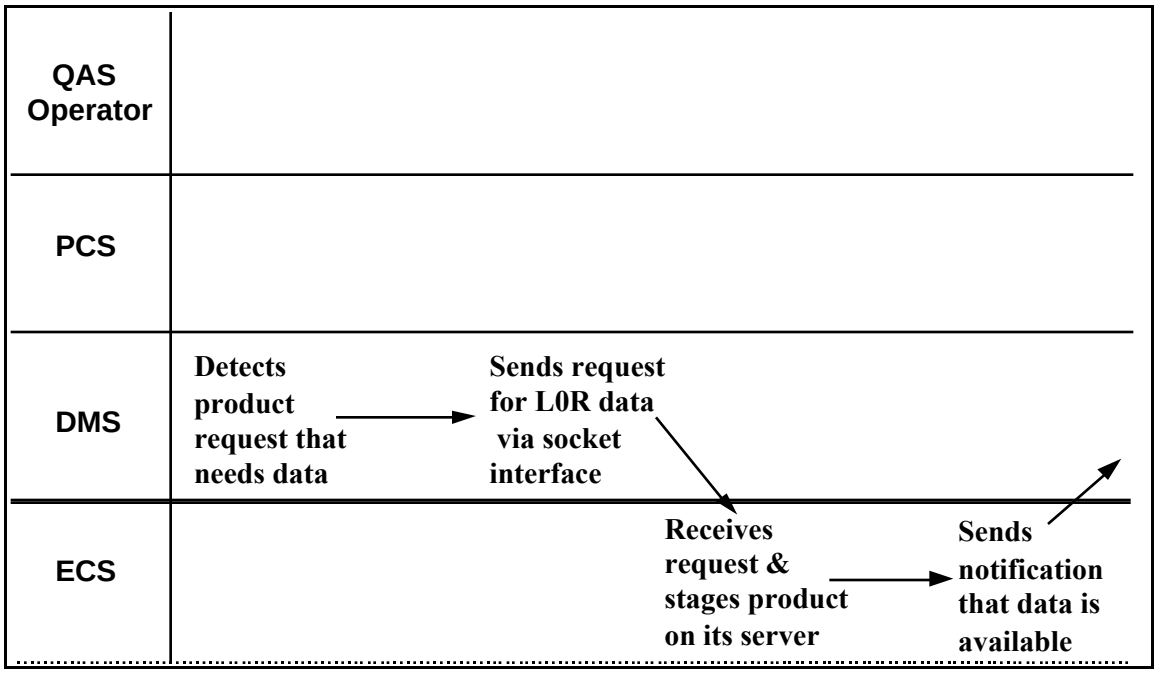
Step	Subsystem/Operator	Action
1	DMS	Poll ECS server for new L1 product generation request
2	DMS	Detect new L1 product generation request
3	DMS	Retrieve and process L1 product generation request
4	DMS	Send L1 product generation response to ECS via ftp
5	DMS	Store info from L1 product generation request in LPGS database

Step	Subsystem/Operator	Action
6	DMS	Assess system ingest criteria for L0R product; indicate if satisfied
7	DMS	Identify the next product generation request that needs L0R data
8	DMS	Create product request directory
9	DMS	Send start session msg to ECS to establish TCP/IP socket connection
10	DMS	Receive start session ack from ECS indicating successful connection
11	DMS	Send L0R data request to ECS
12	DMS	Receive L0R data request acknowledgment from ECS
13	DMS	Send close session msg to terminate TCP/IP socket connection
14	(ECS)	Stage L0R product on ECS disk space
15	(ECS)	Send L0R data availability notice to LPGS via ftp
16	DMS	Poll for new L0R data availability notice
17	DMS	Detect new L0R data availability notice
18	DMS	Retrieve and process L0R data availability notice
19	DMS	Create product request, input, and save directories
20	DMS	Send L0R data availability acknowledgment to ECS via ftp
21	DMS	Retrieve L0R product from ECS via ftp
22	DMS	Verify that the correct L0R product files were received
23	DMS	Catalog L0R product files in database
24	DMS	Send L0R data delivery notice to ECS via ftp
25	DMS	Send L0R data delivery acknowledgment to LPGS via ftp
26	(ECS)	Poll for new L0R data delivery acknowledgment
27	DMS	Detect new L0R data delivery acknowledgment
28	DMS	Retrieve and process L0R data delivery acknowledgment
29	DMS	Update database to indicate that ingest has completed for product generation request
30	PCS	Poll database for product generation requests ready for work order processing (L0R ingest completed)
31	PCS	Detect new product generation request ready for work order processing
32	PCS	Generate work order for product generation request. Determine which procedure to use that identifies scripts to run. Determine script parameter values by overriding default values with information provided in product generation request
33	PCS	Create work order directory
34	PCS	Assess resource availability and start work order processing when adequate resources are available
35	PCS	Set up L0R product processing script parameters
36	PCS	Start L0R product processing script
37	DMS	Check data accuracy, generate L0R statistics, consensus PCD & MSCD
38	DMS	Update database with results
39	PCS	Assess L0R product processing script status to determine processing continues
40	PCS	Set up L1R processing script parameters
41	PCS	Start L1R processing script
42	RPS	Perform radiometric characterization and correction
43	RPS	Update database with results
44	PCS	Assess L1R processing script status to determine processing continues

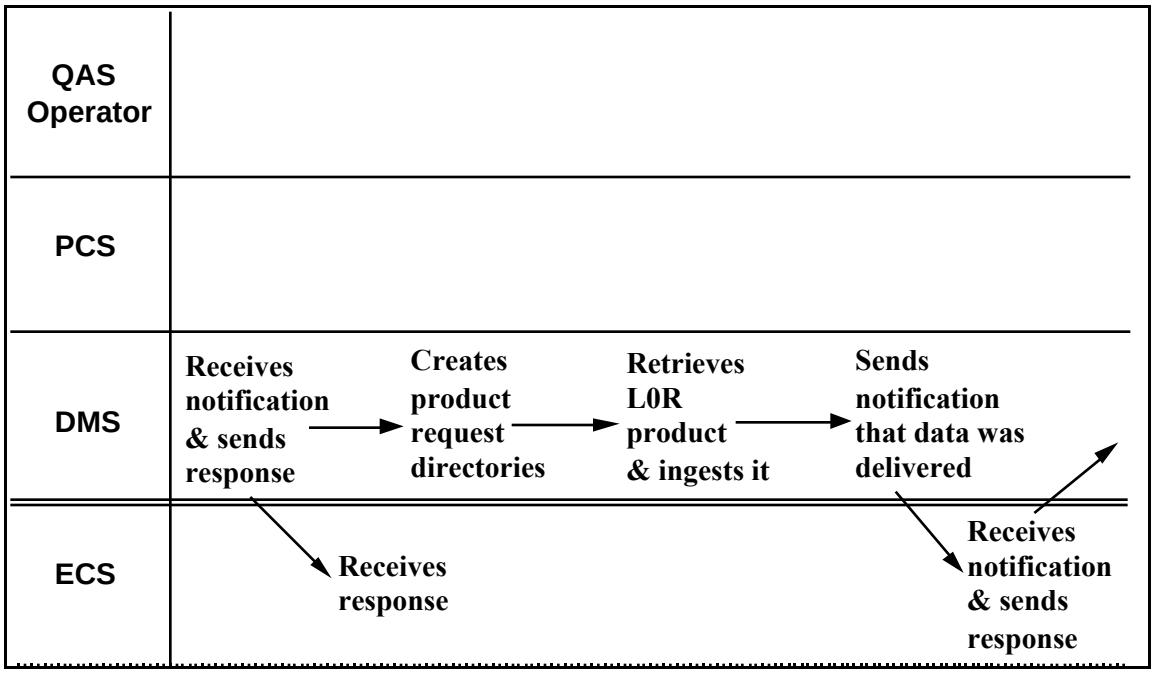
Step	Subsystem/Operator	Action
45	PCS	Set up L1R QA script parameters (including thresholds)
46	PCS	Start L1R QA script
47	QAS	Assess results of radiometric characterization and correction
48	QAS	Update database with L1R QA results
49	PCS	Assess L1R QA script status to determine processing continues
50	QAS Operator	Visually assess the quality of the L1R image
51	QAS Operator	Approve L1R image and resume work order
52	PCS	Set up L1G processing script parameters
53	PCS	Start L1G processing script
54	GPS	Perform geometric correction
55	GPS	Update database with results
56	PCS	Assess L1G processing script status to determine processing continues
57	PCS	Set up L1G QA script
58	PCS	Start L1G QA script
59	QAS	Assess results of geometric correction
60	QAS	Update database with L1G QA results
61	PCS	Assess L1G QA script status to determine processing continues
62	QAS Operator	Visually assess the quality of the L1G image
63	QAS Operator	Approve L1G image and resume work order
64	PCS	Set up formatting script parameters
65	PCS	Start formatting script
66	DMS	Format L1G product
67	DMS	Package L1G product
68	QAS Operator	Visually assess the quality of the formatted product
69	QAS Operator	Approve formatted product and resume work order
70	DMS	Move product to L1 delivery directory
71	DMS	Check product in L1 delivery directory for completeness
72	PCS	Assess formatting script status to determine processing continues
73	PCS	Update database to indicate that L1 product is ready for shipment to ECS and that trending data is available for IAS
74	DMS	Place L1 product availability notice in LPGS directory (ECS- accessible)
75	(ECS)	Poll for new L1 product availability notices
76	(ECS)	Retrieve L1 product via ftp and perform ECS ingest functions
77	(ECS)	Send L1 product availability response to LPGS via ftp
78	DMS	Poll for L1 product availability response
79	DMS	Detect L1 product availability response
80	DMS	Retrieve and process L1 product availability response
81	DMS	Update database to indicate that L1 product has been delivered and product generation request is complete
82	DMS	Update deletion flag for product generation request to indicate that all files associated with request are eligible for deletion



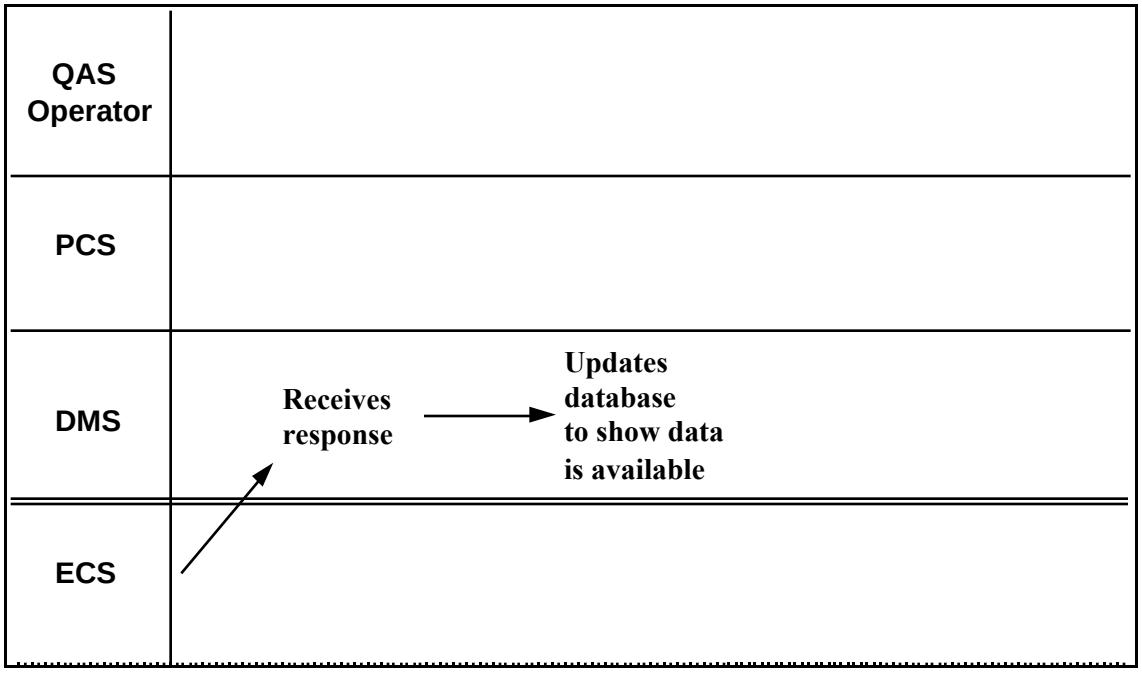
Product Request Retrieval (Steps 1 - 5)



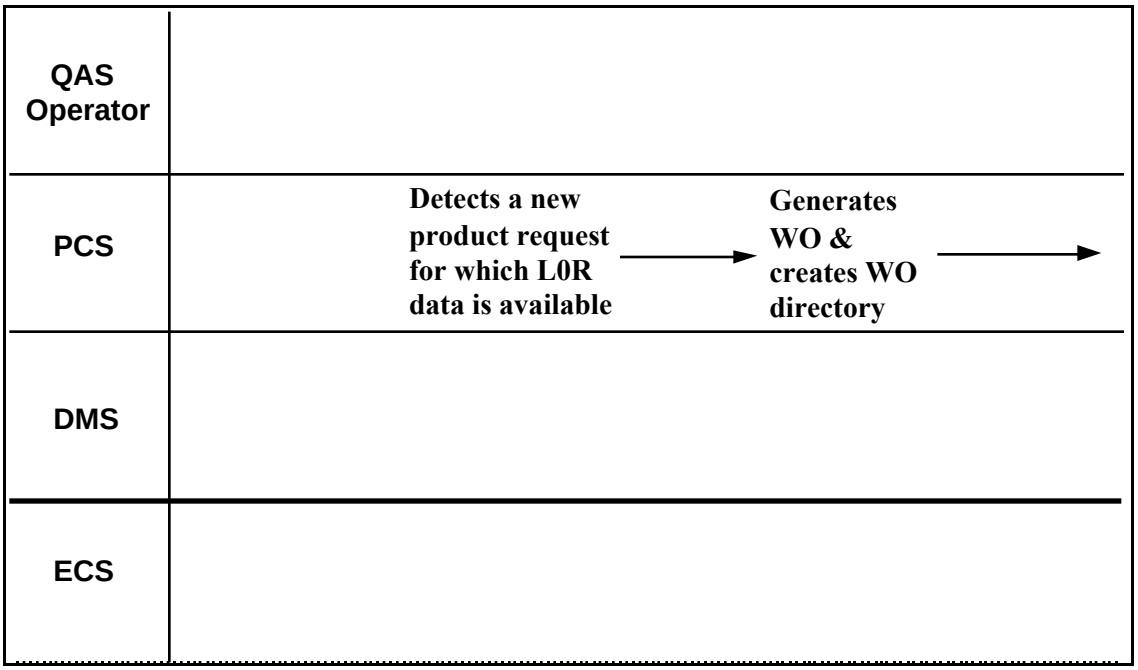
L0R Ingest (Steps 6 - 15)



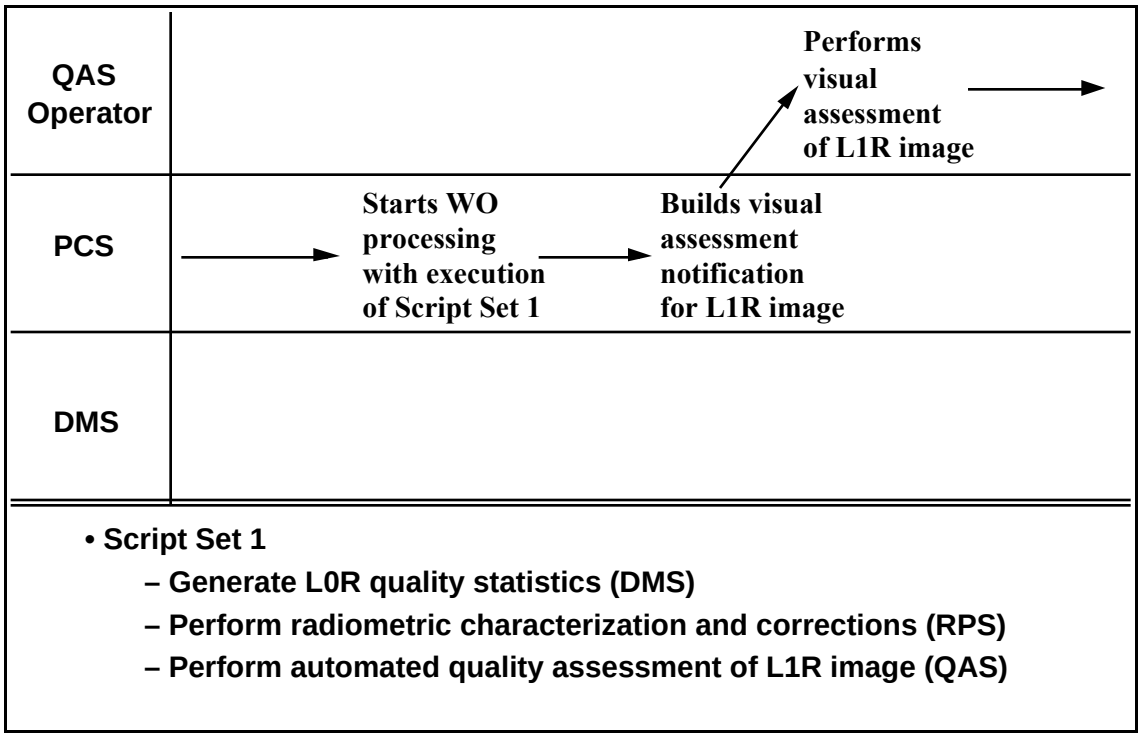
L0R Ingest (Steps 16 - 26)



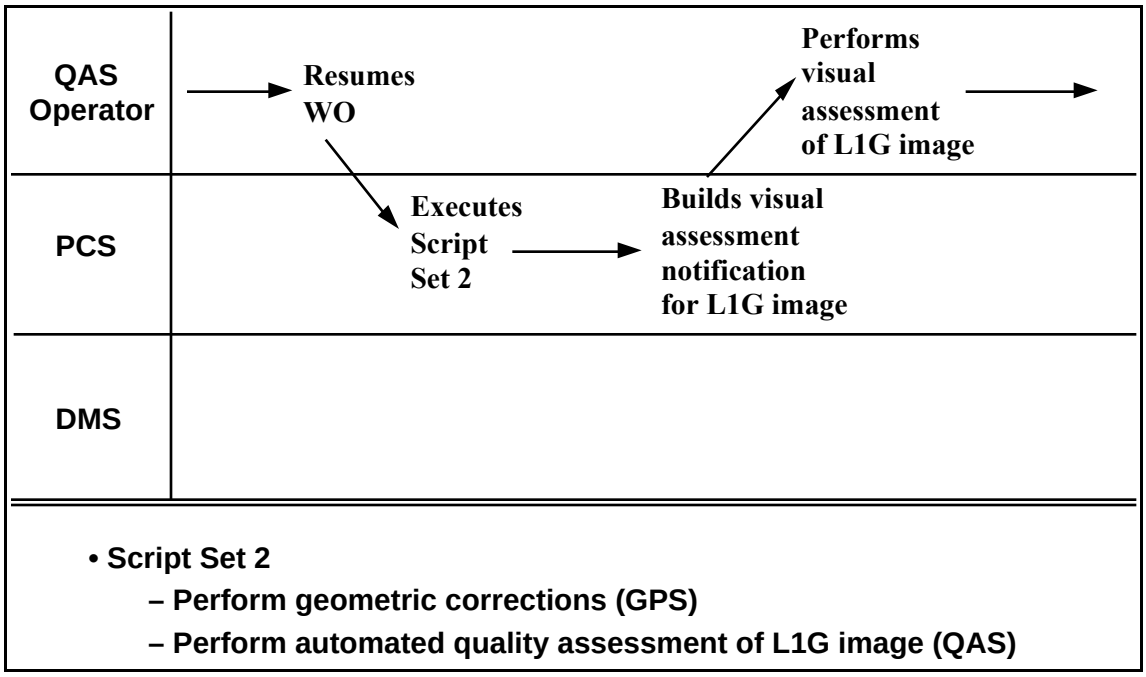
L0R Ingest (Steps 27 - 29)



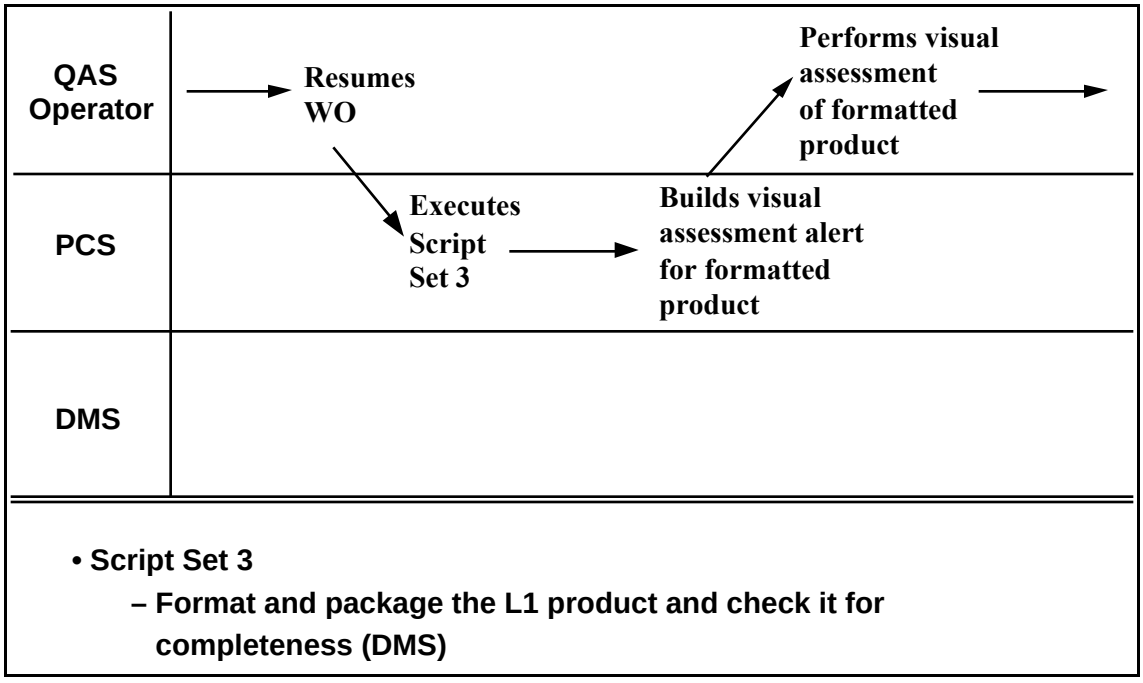
L1 Processing (Steps 30 - 33)



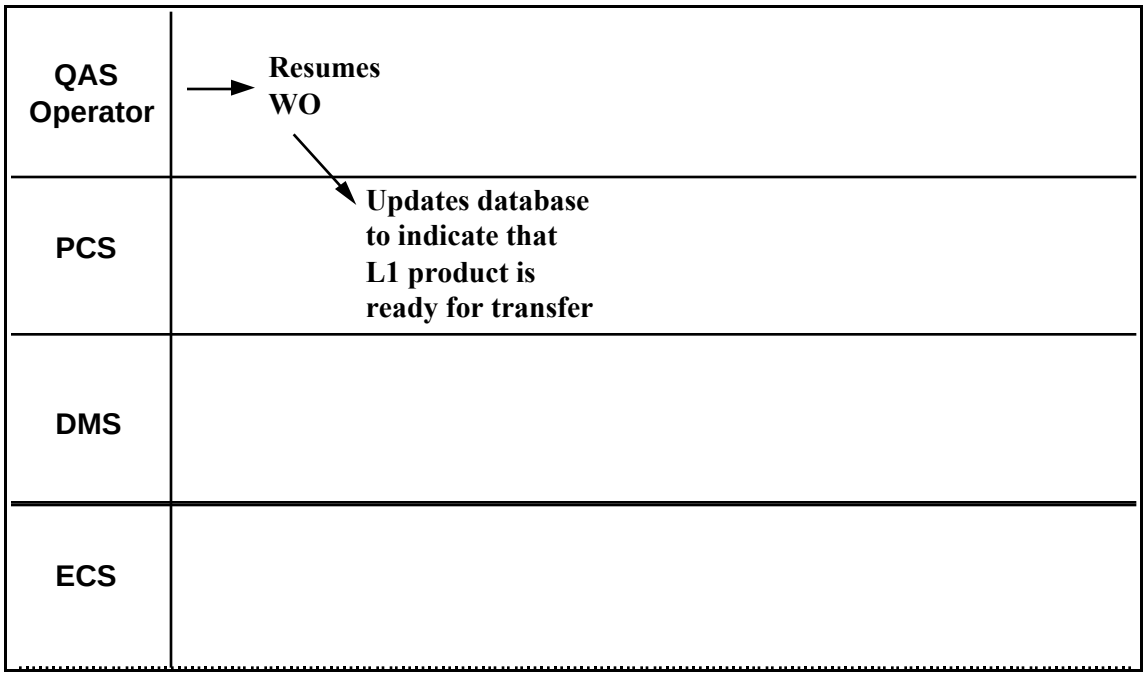
L1 Processing (Steps 34 - 50)



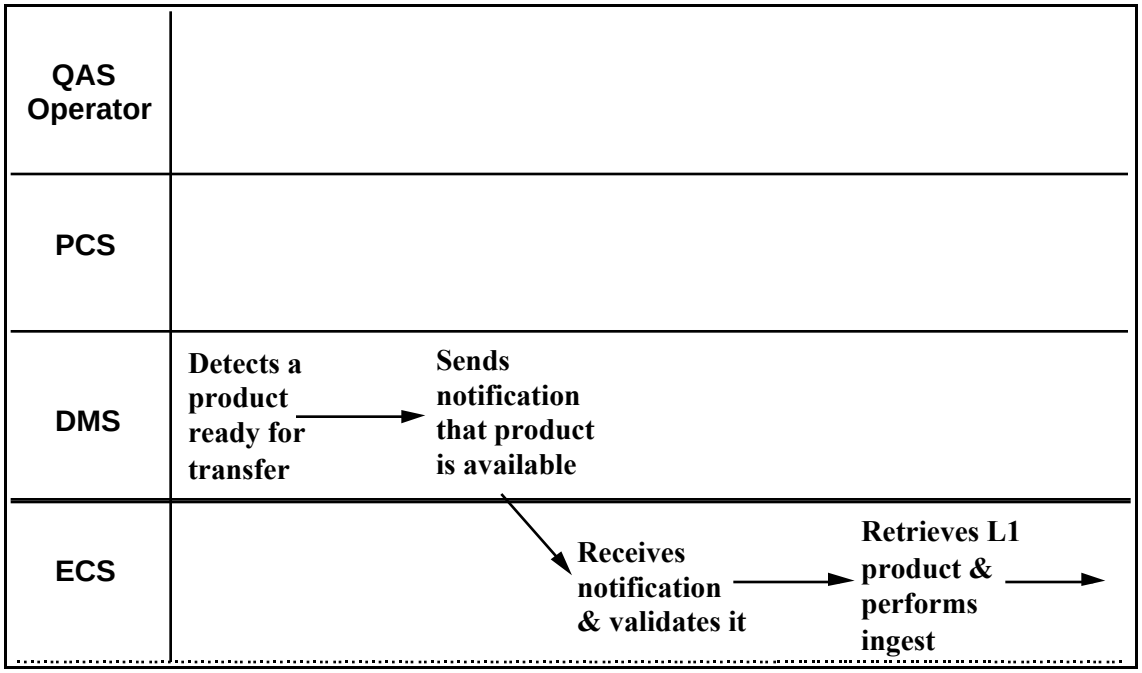
L1 Processing (Steps 51 - 62)



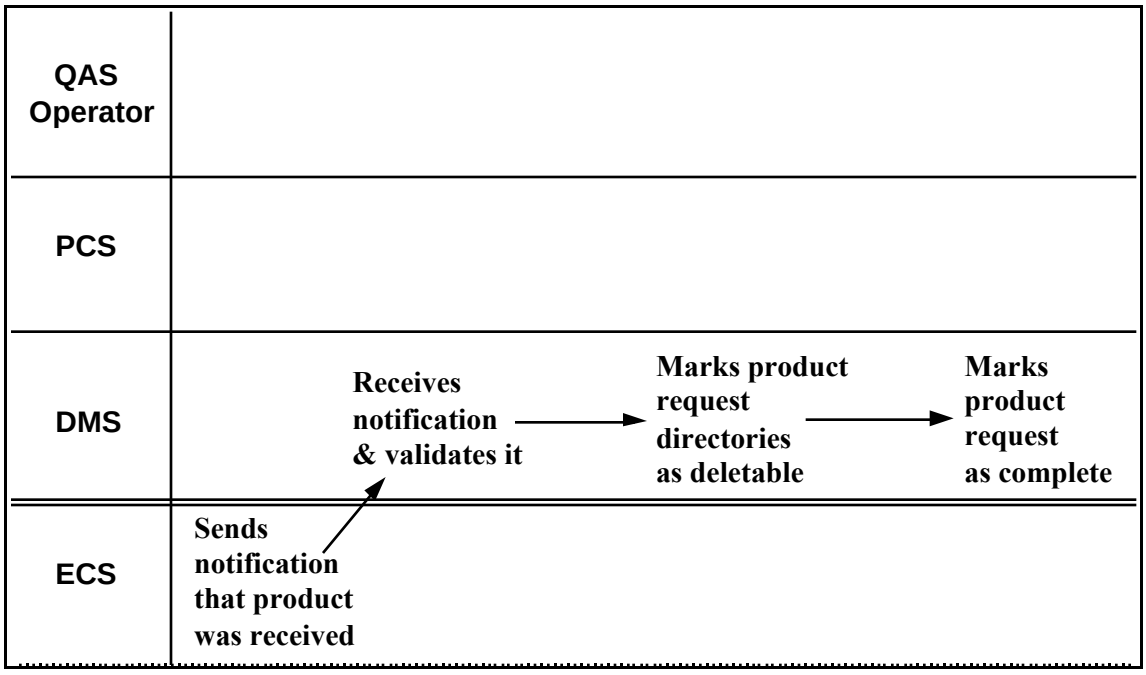
L1 Processing (Steps 63 - 68)



L1 Processing (Steps 69 - 73)



L1 Product Transfer (Steps 74 - 76)



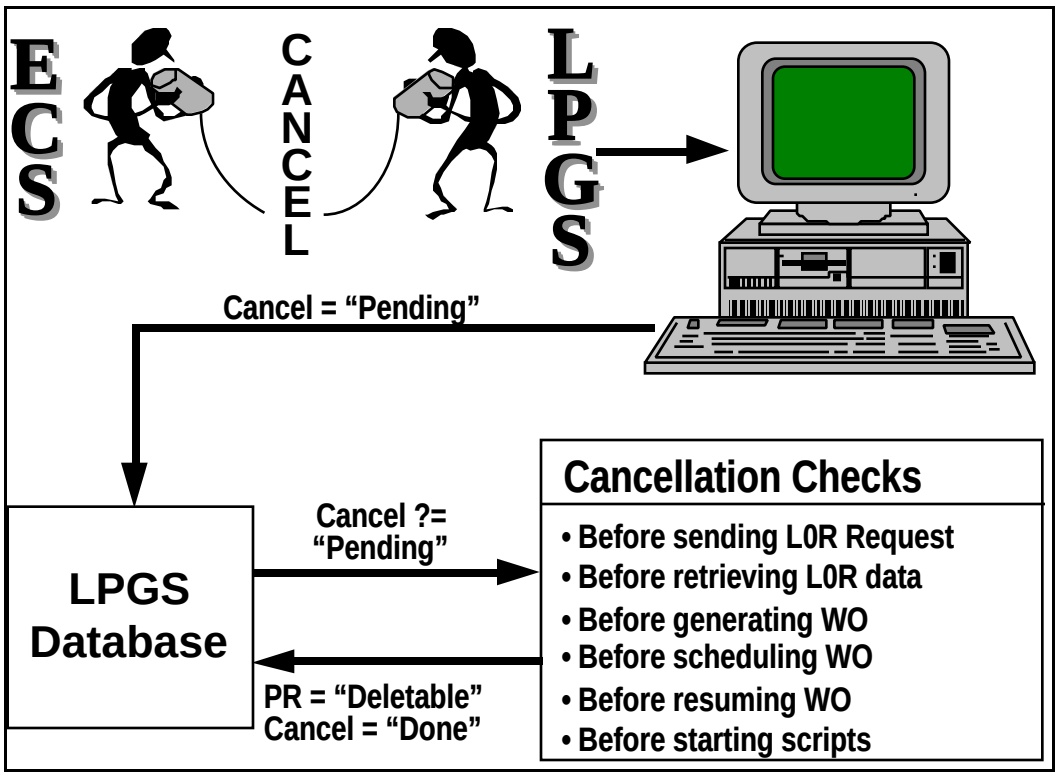
L1 Product Transfer (Steps 77 - 82)

Cancel L1 Processing

LPGS activities for canceling L1 processing are performed to terminate processing and resolve all data associated with the canceled request. Requests for canceling L1 processing can be received at any time after the LPGS receives the applicable L1 product generation request and before the LPGS distributes the product to the ECS. The following scenario assumes that L1 processing of the applicable product generation request has been conducted up to Step 56 of the L1 product processing scenario, which assesses the status of L1G processing script results.

Step	Subsystem/Operator	Action
1	(ECS)	Verbally notify LPGS operator of L1 product cancellation
2	Prod Opr/UI	Display current status of applicable product request
3	Prod Opr/UI	Enter L1 product cancellation request
4	UI/DMS	Update cancellation status of product generation request in database to indicate pending cancellation
5	PCS	When L1G processing script completes, assess status of L1G processing script for applicable work order to determine processing continues
6	PCS	Check cancellation status of product generation request associated with work order
7	PCS	Do not initiate execution of L1G quality assessment script or any subsequent scripts needed to complete nominal L1G processing
8	PCS	Update work order state in database to indicate cancellation
9	PCS	Update product generation request state in database to indicate that it has been canceled
10	PCS	Update deletion flag for the product generation request to indicate that all files associated with request are eligible for deletion

Step	Subsystem/Operator	Action
11	PCS	Update cancellation status for product generation request to indicate that cancellation is complete



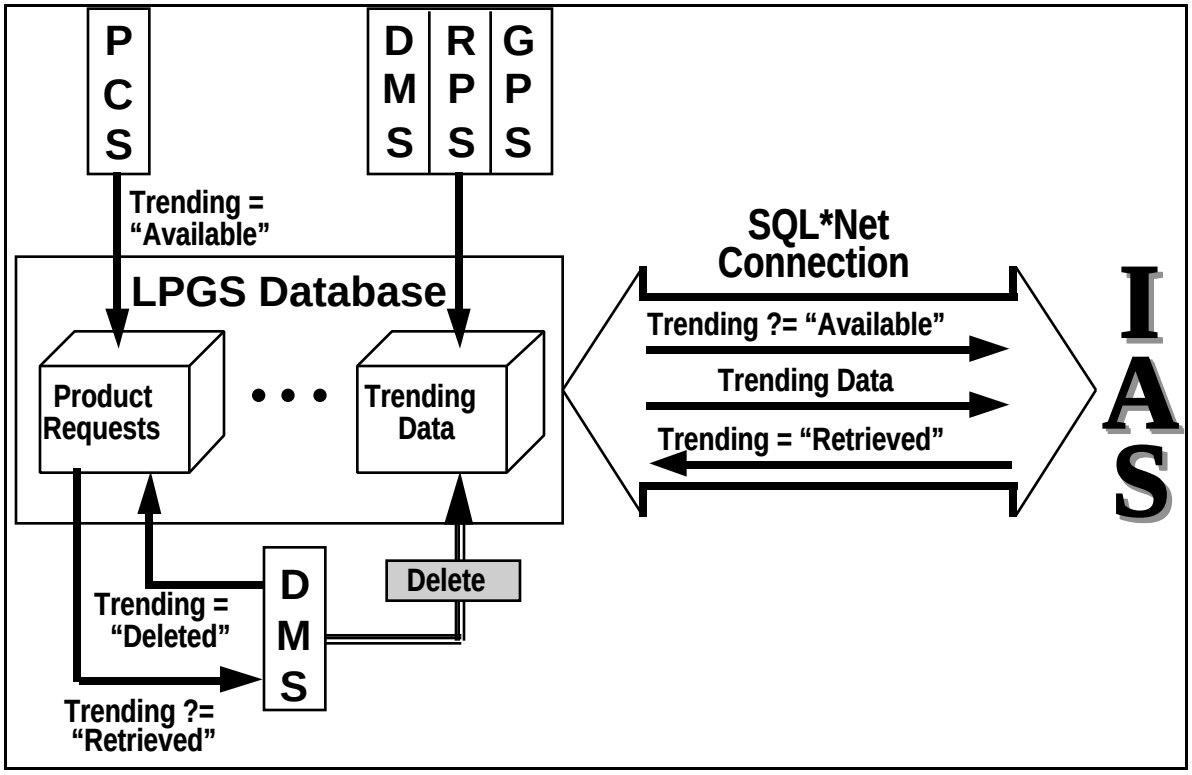
Cancel L1 Processing

Retrieval of Characterization Results by IAS

LPGS activities for transferring characterization results to the IAS are performed to provide the IAS with a source of additional L0R and L1 radiometric characterization statistics for use in trending. After the IAS has retrieved the data, the characterization statistics are deleted from the LPGS database. Characterization results are made available to the IAS by the LPGS for products generated from completed work orders. The results are retrieved by the IAS via Oracle SQL*Net. They are retrieved by the IAS as needed at the discretion of the IAS as indicated in the LPGS/IAS ICD. The DMS, RPS, and GPS tasks generate the trending data and store the data in the database. PCS updates the trending flag for the product generation request to indicate that the data are available for the IAS. The following scenario assumes that characterization results have been written to the LPGS database for completed work orders and that the LPGS startup scenario has been completed successfully.

Step	Subsystem/Operator	Action
1	(IAS)	Connect to LPGS database via SQL*Net
2	(IAS)	Perform query to get changes since last retrieval
3	(IAS)	Retrieve characterization results since last retrieval

Step	Subsystem/Operator	Action
4	(IAS)	Update trending flag for all product generation requests whose trending data has been retrieved
5	(IAS)	Disconnect from LPGS database
6	DMS	Poll for product generation requests where trending data has been retrieved by IAS
7	DMS	Delete trending data associated with product generation request
8	DMS	Update trending flag to indicate that trending data have been deleted



IAS Retrieval of Characterization (Trending) Data

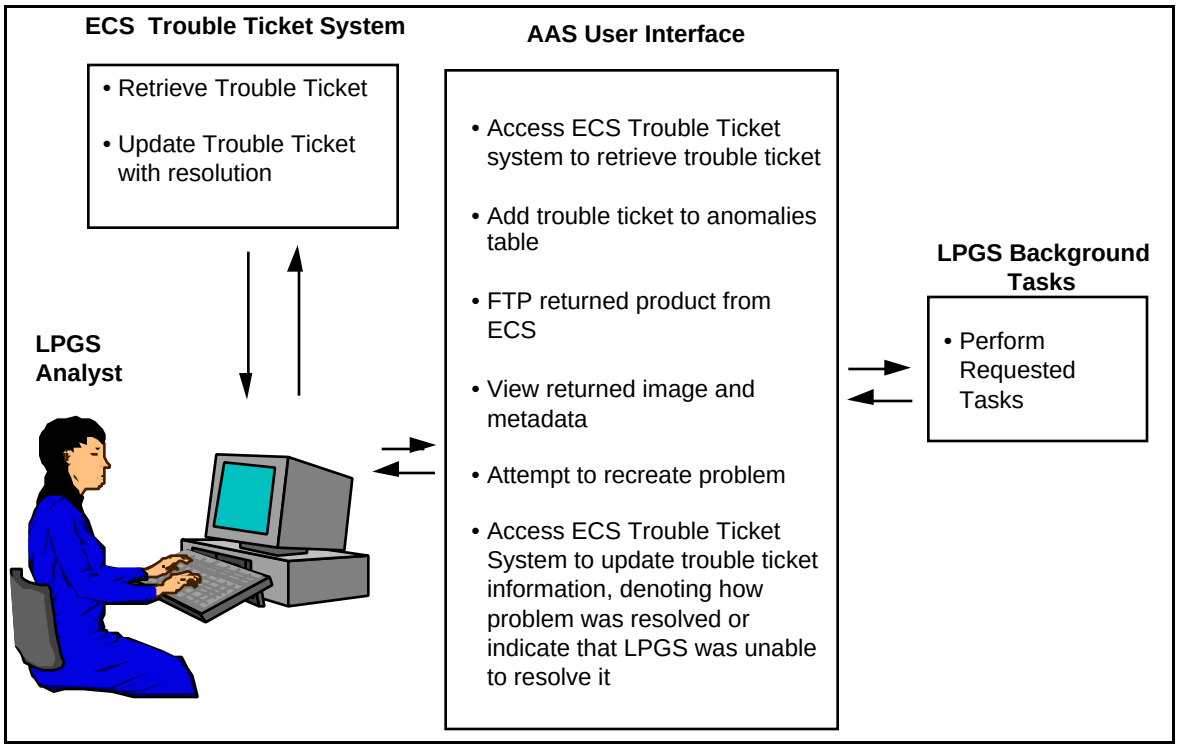
Non-Nominal Operations

Non-nominal operations scenarios are presented in the subsections below. The scenarios are provided as examples of typical non-nominal operations activities and are not intended to indicate the only sequence of activities that may occur.

Analyze Trouble Ticket

LPGS AA activities are performed to identify and resolve anomalies in images produced by the LPGS. The scenario below provides an example of AA in which a trouble ticket is received for an image that has been distributed to a customer, the image problems were reproduced upon reprocessing, and the cause of the problem was found and corrected.

Step	Subsystem/Operator	Action
1	Analyst	Receive notification by e-mail or phone that there is a new trouble ticket assigned to LPGS
2	Analyst/AAS	Access ECS trouble ticket system through UI menu and query for new trouble ticket
3	Analyst/AAS	Access Enter New Anomaly function through UI menu to manually record trouble ticket information into anomalies table
4	Analyst/AAS	If original user product was returned, use ftp to copy product to LPGS disk space (from ECS disk)
5	Analyst/AAS	Access View Image function through UI menu to display original image
6	Analyst	Attempt to verify reported problem. View browse image (View Image) and check metadata (View File)
7	Analyst/AAS	If analyst wishes to rerun request, access Generate Product Request function through UI menu. Store new product request in database
8	DMS	Ingest L0R data required (see steps 6-28 in Section 3.3.3)
9	PCS	Generate work order and set state to “held”
10	Analyst/AAS	Access Modify Work Order function from UI menu to add pauses or to change any parameters
11	Prod Opr/Analyst/AAS	At appropriate time, activate work order
12	Analyst	Monitor and control script processing
13	Analyst	Visually examine product request, work order, work order log, event log, calibration file, QA results, etc.
14	Analyst/AAS	Access View Image function through UI menu to display image
15	Analyst/AAS	If additional run is required, access Generate Work Order function from UI to generate diagnostic work order. This function also generates work order directory
16	Prod Opr/Analyst/AAS	At appropriate time, access Activate Work Order function to activate work order
17	Analyst	Monitor and control script processing
18	Analyst/AAS	Visually inspect results (using View Image)
19	Analyst/ AAS	If problem has been resolved, access View/Edit Anomaly function to record resolution in anomalies table
20	Analyst/AAS	Access ECS trouble ticket system through Generate Response function and enter trouble ticket response
21	Analyst/AAS	Manually delete image file provided by ECS in support of trouble ticket



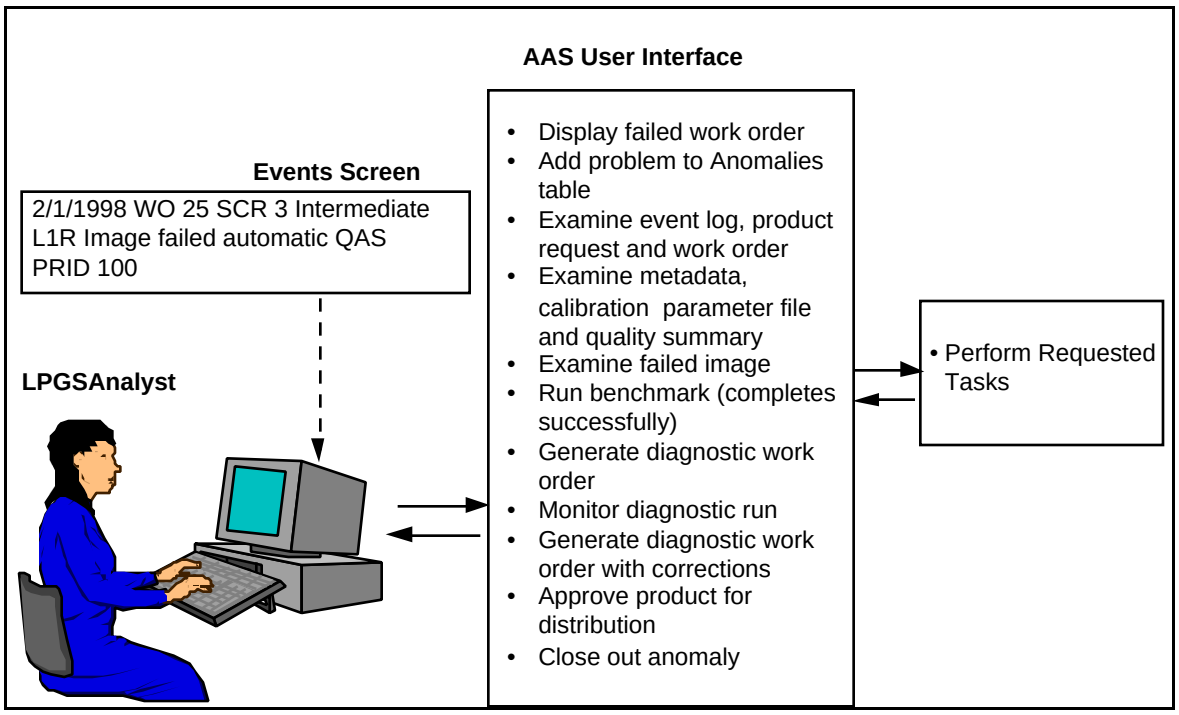
Trouble Ticket Analysis

Process L1 Product (Non-Nominal)

The non-nominal process L1 product scenario provides an example of the resolution of image anomalies found during routine L1 production processing. The scenario assumes that the nominal process L1 product scenario has been conducted up to Step 49. At this point in the L1R processing, quality statistics exceed established thresholds and do not meet quality criteria. This scenario example assumes that the image problem can be resolved by modifying image processing parameters that are specified in the processing work order.

Step	Subsystem/Operator	Action
1	QAS	L1 image fails automated QA
2	PCS	Assess L1R quality script status and update work order (WO) state in database to indicate anomaly has occurred. Send message to operator/analyst indicating WO processing has failed
3	Analyst/AAS	Access Work Order Information function to display failed work order
4.	Analyst/AAS	Access Enter New Anomaly function to add new problem to anomalies table using information available from WO display
5	Analyst/AAS	Access View Event Log function to view event log, Product Request Information function to view product generation request, and Work Order Information function to view WO
6	Analyst/AAS	Access View Files function to view WO log, metadata, and calibration files
7	Analyst/AAS	Access View Image function to view L0R and L1R images

Step	Subsystem/Operator	Action
8	Analyst	Develop plan for isolating problem (in this case, suspect systematic problem)
9	Analyst/AAS	Access Generate Work Order function to generate a benchmark WO to verify that LPGS is working properly. Generate WO directory
10	Analyst/AAS	Access Activate Work Order function to activate benchmark WO
11	LPGS	Run benchmark [starting from step 33 of nominal processing flow (Section 3.3.3)]
12	Analyst	Confirm that benchmark run is successful (localized problem rather than systematic one)
13	Analyst/AAS	Access Generate Work Order function to create diagnostic WO to process user request with AAS monitoring capabilities. Generate WO directory
14	Analyst/AAS	Access Activate Work Order function to activate and promote diagnostic WO
15	LPGS	Run diagnostic WO [starting from step 33 of nominal processing flow (Section 3.3.3)]
16	Analyst	Monitor and control script processing
17	Analyst	Detect cause of problem that appears correctable and verify necessary processing modifications are documented in log
18	Analyst/AAS	Access Generate Work Order function to create reprocessing WO w/ necessary corrections. Create work order directory
19	LPGS	Run reprocessing WO and deliver product
20	Analyst/AAS	Access View/Edit Anomaly function to close out anomaly and record resolution in anomalies table



L1 Product Non-Nominal Processing

Recover From LPGS Failure

LPGS failure recovery activities are performed to isolate and resolve LPGS subsystem failures, notify DAAC management and other affected elements of processing impacts, and continue product processing to the greatest extent possible when failures are isolated to a specific subsystem. The following scenario provides an example of recovery from failures within PCS and assumes that the failure can be resolved by system and production operators without modifying the controlled LPGS configuration.

Step	Subsystem/Operator	Action
1	PCS	Work Order Scheduler (PWS) terminates abnormally
2	PCS	Notify operator of unexpected termination
3	Prod Opr	Display product request processing status
4	Prod Opr	Estimate processing impacts
5	Sys Opr	By voice communications, notify DAAC Manager and EDC DAAC User Services of failure and estimate processing impacts
6	Analyst	Continue QAs and image analysis as much as possible
7	Sys Opr/Prod Opr	Follow operations procedures to resolve and recover from failure
8	Sys Opr	Notify DAAC Manager and EDC DAAC User Services of estimated time to return to full operations
9	Sys Opr/Prod Opr	Resolve failure
10	Prod Opr	Run Recovery function to perform cleanup
11	Sys Opr	Access Restart Tasks function to restart PWS
12	Sys Opr	Notify DAAC Manager and EDC DAAC User Services of return to full operations